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WHAT IS CLAIMED IS:

1   1. A scheduling system comprising:

2   a time slot for specifying the transfer sequence of

3   individual lines in one turn, in which each cell is transferred,

4   in slots indicating respective points in the turn;

5   a cell read sequence management table which has elements

6   in the same number as the number of slots provided in the time

7   slot and sets the lines as cell transfer objects to the

8   elements;

9   schedule computation means for controlling the setting of

10   the lines to the cell read sequence management table;

11   allocation processing means for converting the elements

12   of the cell read sequence management table respectively to

13   specified positions of the slots in the time slot; and

14   a schedule management table for indicating positions,

15   within the cell read sequence management table, to which

16   transfer object lines are newly set, for each PCR value of the

17   lines, said PCR value being the number of cells, transferred

18   from the line, per cell transfer turn and representing the cell

19   send rate of each line,

20   the specified line cells being successively transferred

21   for each turn according to the sequence specified in the time

22   slot,

23   the cell read transfer sequence in each line being

24   controlled according to the cell send rate in each of the lines.

1   2. The scheduling system according to claim 1, wherein

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2　　　　the schedule computation means comprises:

3　　　　means which, when a requirement is satisfied such that

4　there is an idle element, in the cell read sequence management

5　table, which is located one element ahead of a position of an

6　element corresponding to a value obtained by multiplying the

7　specified PCR value by an integer, and the contemplated line

8　can be set to continuous elements starting from the idle

9　element and corresponding to the specified PCR value and, in

10　addition, when an element is present in the heading area of the

11　continuous elements, functions to catalog the position of said

12　element, which is located one element ahead of a position of an

13　element corresponding to a value obtained by multiplying the

14　specified PCR value by an integer, as data indicating the set

15　position of the line having the specified PCR value, in

16　relation with the PCR value in the schedule management table;

17　　　　means which, when a line to be newly transferred has

18　occurred, newly sets the line to continuous elements

19　corresponding to the PCR value of the line, in the cell read

20　sequence management table, from the set position corresponding

21　to the PCR value of the line recorded in the schedule

22　management table;

23　　　　means which, when the communication of a line being

24　currently transferred has been deleted, cancels the setting of

25　the line from the element, in the cell read sequence management

26　table, to which the line has been set; and

27　　　　means which, when new setting or delete of a transfer

28　object line has occurred, updates the catalog of the schedule

29　management table.

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1 3. The scheduling system according to claim 2, wherein

2 the allocation processing means comprises:

3 means which converts the elements within the cell read

4 sequence management table, to respective specified positions

5 within the time slot, based on the designation of the slot

6 position as the conversion destination for each element

7 specified in such a manner that the continuous elements

8 corresponding to the PCR value, that have been ensured from a

9 position which is one element ahead of a position of an element

10 corresponding to a value obtained by multiplying the PCR value

11 by an integer, in the cell read sequence management table are

12 converted to respective positions dispersed at equal spacings

13 in the time slot; and

14 means which, when a line is in the state of being set to

15 elements in the cell read sequence management table, performs

16 specifying and setting, in a slot as the conversion destination

17 of the line in the time slot, so as to transfer cells of the

18 line.

1 4. The scheduling system according to claim 2 or 3,

2 wherein the number of slots in the time slot and the PCR value

3 of each of the lines each are a value obtained by raising "2"

4 to the nth power, wherein n is a non-negative integer.

1 5. The scheduling system according to claim 4, wherein

2 the conversion from the cell read sequence management

3 table to the time slot is carried out by a method comprising

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4 the steps of:

5   raising "2" to the "Ath" power, wherein "A" is an

6 integer, to provide a value as the length of the time slot;

7   indicating the positions of the individual elements in

8 the cell read sequence management table and the slot positions

9 of the time slot by using continuous numbers from "1" to the

10 value of the time slot length;

11   taking each element from the cell read sequence

12 management table;

13   subtracting "1" from the value of the continuous numbers

14 in the element and expressing the obtained value in terms of

15 binary number of "A" digits while, when a high order value is

16 absent, supplementing "0";

17   converting the numerical values of the "A" digits

18 expressed in terms of binary number so as to be reversed in

19 sequence with respect to the arrangement from higher order

20 digit to lower order digit to provide a converted binary number

21 of "A" digits; and

22   adding "1" to the value of the converted binary number of

23 "A" digits to determine a value as a slot position, in the time

24 slot, which is the element conversion destination.

1   6. The scheduling system according to any one of claims 2

2 to 5, wherein the schedule computation means performs a

3 function such that, upon the cancellation of the setting of a

4 line from the elements in the cell read sequence management

5 table, if another line having a smaller PCR value than said

6 line is in the state of being set to a position behind the

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7 position to which the said line has been set, the set position

8 of said another line is moved to the position from which the

9 setting of said line has been cancelled.

1 7. The scheduling system according to any one of claims 2

2 to 5, wherein the schedule computation means performs a

3 function such that, upon the cancellation of the setting of a

4 line from the elements in the cell read sequence management

5 table, if other lines having a smaller PCR value than said line

6 are in the state of being set to positions behind the position

7 to which the said line has been set, the set position of one

8 line, which has the largest PCR value in said other lines and

9 is located in the rearmost position of said other lines, is

10 moved to the position from which the setting of said line has

11 been cancelled.

1 8. The scheduling system according to any one of claims 1

2 to 7, wherein said line is an ATM line.

1 9. A scheduling method comprising the steps of:

2 indicating the send rate of cells in each line in terms

3 of PCR value which is the number of cells, transferred from the

4 line, per cell transfer turn;

5 successively transferring cells of a specified line

6 according to the sequence specified in slots, in a time slot

7 for specifying the transfer sequence of individual lines in the

8 cell transfer turn, indicating each point in the turn;

9 controlling the setting of each line in a cell read

10 sequence management table which has elements in the same number

11 as the number of slots provided in the time slot and sets the

12 lines as cell transfer objects to the elements;

13   converting the individual elements in the cell read

14 sequence management table to respective specified slot

15 positions in the time slot; and

16   properly updating and making reference to a schedule

17 management table which indicates positions, within the cell

18 read sequence management table, to which transfer object lines

19 are newly set, for each PCR value of the lines,

20   the cell read transfer sequence in each line being

21 controlled according to the cell send rate in each of the lines.

1   10. The scheduling method according to claim 9, which

2 further comprises the steps of:

3   when a requirement is satisfied such that there is an

4 element, in the cell read sequence management table, which is

5 located one element ahead of a position of an element

6 corresponding to a value obtained by multiplying the specified

7 PCR value by an integer, and the contemplated line can be set

8 to continuous elements starting from the idle element and

9 corresponding to the specified PCR value and, in addition, when

10 an element is present in the heading area of the continuous

11 elements, cataloging the position of said element, which is

12 located one element ahead of a position of an element

13 corresponding to a value obtained by multiplying the specified

14 PCR value by an integer, as data indicating the set position of

15 the line having the specified PCR value within the cell read

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16   sequence management table, in relation with the PCR value in

17   the schedule management table;

18   when a line to be newly transferred has occurred, newly

19   setting the line to continuous elements corresponding to the

20   PCR value of the line, in the cell read sequence management

21   table, from the set position corresponding to the PCR value of

22   the line recorded in the schedule management table;

23   when the communication of a line being currently

24   transferred has been deleted, canceling the setting of the line

25   from the element, in the cell read sequence management table,

26   to which the line has been set; and

27   when new setting or delete of a transfer object line has

28   occurred, updating the catalog of the schedule management table.

1   11. The scheduling method according to claim 10, which

2   further comprises the steps of:

3   converting the elements within the cell read sequence

4   management table, to respective specified positions within the

5   time slot, based on the designation of the slot position as the

6   conversion destination for each element specified in such a

7   manner that the continuous elements corresponding to the PCR

8   value, that have been ensured from a position which is one

9   element ahead of a position of an element corresponding to a

10   value obtained by multiplying the PCR value by an integer, in

11   the cell read sequence management table are converted to

12   respective positions dispersed at equal spacings in the time

13   slot; and

14   when a line is in the state of being set to elements in

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15   the cell read sequence management table, performing specifying

16   and setting, in a slot as the conversion destination of the

17   line in the time slot, so as to transfer cells of the line.

1   12. The scheduling method according to claim 10 or 11,

2   wherein the number of slots in the time slot and the PCR value

3   of each of the lines each are a value obtained by raising "2"

4   to the nth power, wherein n is a non-negative integer.

1   13. The scheduling method according to claim 12, wherein

2   the conversion from the cell read sequence management

3   table to the time slot is carried out by a method comprising

4   the steps of:

5   raising "2" to the "Ath" power, wherein "A" is an

6   integer, to provide a value as the length of the time slot;

7   indicating the positions of the individual elements in

8   the cell read sequence management table and the slot positions

9   of the time slot by using continuous numbers from "1" to the

10   value of the time slot length;

11   taking each element from the cell read sequence

12   management table;

13   subtracting "1" from the value of the continuous numbers

14   in the element and expressing the obtained value in terms of

15   binary number of "A" digits while, when a high order value is

16   absent, supplementing "0";

17   converting the numerical values of the "A" digits

18   expressed in terms of binary number so as to be reversed in

19   sequence with respect to the arrangement from higher order

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20 digit to lower order digit to provide a converted binary number
21 of "A" digits; and

22   adding "1" to the value of the converted binary number of
23 "A" digits to determine a value as a slot position, in the time
24 slot, which is the element conversion destination.

1   14. The scheduling method according to any one of claims
2   10 to 13, wherein, upon the cancellation of the setting of a
3   line from the elements in the cell read sequence management
4   table, if another line having a smaller PCR value than said
5   line is in the state of being set to a position behind the
6   position to which the said line has been set, the set position
7   of said another line is moved to the position from which the
8   setting of said line has been cancelled.

1   15. The scheduling method according to any one of claims
2   10 to 13, wherein, upon the cancellation of the setting of a
3   line from the elements in the cell read sequence management
4   table, if other lines having a smaller PCR value than said line
5   are in the state of being set to positions behind the position
6   to which the said line has been set, the set position of one
7   line, which has the largest PCR value in said other lines and
8   is located in the rearmost position of said other lines, is
9   moved to the position from which the setting of said line has
10 been cancelled.

1   16. The scheduling method according to any one of claims
2   9 to 15, wherein said line is an AMT line.

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1   17. An ATM switch comprising a scheduling system such

2   that the cell read transfer sequence in each ATM line is

3   controlled according to the cell send rate in each of the ATM

4   lines, wherein

5   said scheduling system

6   expresses the cell send rate, in each of the ATM lines,

7   in terms of PCR value, which is the number of cells,

8   transferred from the ATM line, per cell transfer turn and

9   comprises:

10   a time slot for specifying the transfer sequence of the

11   ATM lines in one turn, in which each cell is transferred, in

12   slots indicating respective points in the turn;

13   a cell read sequence management table which has elements

14   in the same number as the number of slots provided in the time

15   slot and sets the ATM lines as cell transfer objects to the

16   elements;

17   schedule computation means for controlling the setting of

18   the ATM lines to the cell read sequence management table;

19   allocation processing means for converting the elements

20   of the cell read sequence management table respectively to

21   specified positions of the slots in the time slot; and

22   a schedule management table for indicating positions,

23   within the cell read sequence management table, to which

24   transfer object ATM lines are newly set, for each PCR value of

25   the ATM lines,

26   the specified ATM line cells being successively

27   transferred for each turn according to the sequence specified

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28　in the time slot.

1　　　18.　The ATM switch according to claim 17, wherein

2　　　the schedule computation means comprises:

3　　　means which, when a requirement is satisfied such that

4　there is an idle element, in the cell read sequence management

5　table, which is located one element ahead of a position of an

6　element corresponding to a value obtained by multiplying the

7　specified PCR value by an integer, and the contemplated ATM

8　line can be set to continuous elements starting from the idle

9　element and corresponding to the specified PCR value and, in

10　addition, when an element is present in the heading area of the

11　continuous elements, functions to catalog the position of said

12　element, which is located one element ahead of a position of an

13　element corresponding to a value obtained by multiplying the

14　specified PCR value by an integer, as data indicating the set

15　position of the ATM line having the specified PCR value, in

16　relation with the PCR value in the schedule management table;

17　　　means which, when an ATM line to be newly transferred has

18　occurred, newly sets the ATM line to continuous elements

19　corresponding to the PCR value of the ATM line, in the cell

20　read　sequence　management　table,　from　the　set　position

21　corresponding to the PCR value of the ATM line recorded in the

22　schedule management table;

23　　　means which, when the communication of an ATM line being

24　currently transferred has been deleted, the setting of the ATM

25　line is cancelled from the element, in the cell read sequence

26　management table, to which the ATM line has been set; and

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27　　　means which, when new setting or delete of a transfer

28　object ATM line has occurred, updates the catalog of the

29　schedule management table.

1　　　19. The ATM switch according to claim 18, wherein

2　　　the allocation processing means comprises:

3　　　means which converts the elements within the cell read

4　sequence management table, to respective specified positions

5　within the time slot, based on the designation of the slot

6　position as the conversion destination for each element

7　specified in such a manner that the continuous elements

8　corresponding to the PCR value, that have been ensured from a

9　position which is one element ahead of a position of an element

10　corresponding to a value obtained by multiplying the PCR value

11　by an integer, in the cell read sequence management table are

12　converted to respective positions dispersed at equal spacings

13　in the time slot; and

14　　　means which, when an ATM line is in the state of being

15　set to elements in the cell read sequence management table,

16　performs specifying and setting, in a slot as the conversion

17　destination of the ATM line in the time slot, so as to transfer

18　cells of the ATM line.

1　　　20. The ATM switch according to claim 18 or 19, wherein

2　the number of slots in the time slot and the PCR value of each

3　of the ATM lines each are a value obtained by raising "2" to

4　the nth power, wherein n is a non-negative integer.

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1   21. The ATM switch according to claim 20, wherein

2   the conversion from the cell read sequence management

3 table to the time slot is carried out by a method comprising

4 the steps of:

5   raising "2" to the "Ath" power, wherein "A" is an

6 integer, to provide a value as the length of the time slot;

7   indicating the positions of the individual elements in

8 the cell read sequence management table and the slot positions

9 of the time slot by using continuous numbers from "1" to the

10 value of the time slot length;

11   taking each element from the cell read sequence

12 management table;

13   subtracting "1" from the value of the continuous numbers

14 in the element and expressing the obtained value in terms of

15 binary number of "A" digits while, when a high order value is

16 absent, supplementing "0";

17   converting the numerical values of the "A" digits

18 expressed in terms of binary number so as to be reversed in

19 sequence with respect to the arrangement from higher order

20 digit to lower order digit to provide a converted binary number

21 of "A" digits; and

22   adding "1" to the value of the converted binary number of

23 "A" digits to determine a value as a slot position, in the time

24 slot, which is the element conversion destination.

1   22. The ATM switch according to any one of claims 18 to

2 21, wherein the schedule computation means performs a function

3 such that, upon the cancellation of the setting of an ATM line

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4   from the elements in the cell read sequence management table,

5   if another ATM line having a smaller PCR value than said ATM

6   line is in the state of being set to a position behind the

7   position to which the said ATM line has been set, the set

8   position of said another ATM line is moved to the position from

9   which the setting of said ATM line has been cancelled.

1   23. The ATM switch according to any one of claims 18 to

2   21, wherein the schedule computation means performs a function

3   such that, upon the cancellation of the setting of an ATM line

4   from the elements in the cell read sequence management table,

5   if other ATM lines having a smaller PCR value than said ATM

6   line are in the state of being set to positions behind the

7   position to which the said ATM line has been set, the set

8   position of one ATM line, which has the largest PCR value in

9   said other ATM lines and is located in the rearmost position of

10   said other ATM lines, is moved to the position from which the

11   setting of said ATM line has been cancelled.